

# AVIATION

*The Oldest American Aeronautical Magazine*

MAY 18, 1924

Issued Weekly

PRICE 10 CENTS



The Start of the National Elimination Balloon Race

VOLUME  
XVIII

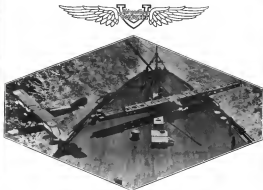
## SPECIAL FEATURES

NUMBER  
20

THE WACO MODEL 9  
HOUSING THE AIR MAIL  
STABILITY AND CONTROLLABILITY OF AIRPLANES

GARDNER PUBLISHING CO., Inc.  
HIGHLAND, N. Y.  
225 FOURTH AVENUE, NEW YORK

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MAY 18, 1925

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VOL. XVIII NO. 20

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cial engineers, both American and foreign, watching this advance realize that they can now obtain in the Wright J-4 all the many advantages of an air-cooled power plant.

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No. 29

### The First Wright Airplane

**W**HILE scientific experts become partisan and propaganda may lead of statements may be expected. In the case of the testimony of partisan scientific experts may be expected in every side of almost any question, no matter how purely it is opposed to the public good. Government scientific men and institutions are supposed to keep clear of this sort of controversy. But evidence for Professor Langley and pale in the achievements of the Smithsonian Institution has brought about a situation that raises a question as to the scientific propriety. If Langley had not been secretary of the Smithsonian, it is not probable that the greatest effort of his life would have been made to perpetuate an erroneous opinion of the public mind. He would have been relegated to an isolated position in the list of pioneers in human flight. Indeed, for the last ten years, there has been constant and enough deliberate efforts made to place the name of Langley and of the Wrights in the history of discovering a method of a means to fly. The powerful have been the political and departmental influence behind these attempts that even the Langley record in greatest field and where was then intended to be his great experimental station, Langley, while a strong department knew the name of Wright, as the Navy, the first airplane carrier in called The Langley while a balloon mother ship is known as The Wright.

There is little need to recount how the original Langley airplane was reserved for the purpose of the tests. It is enough to know that it was done. On its return to the museum it was given a label that would suppress the significance that it was the first successful airplane.

For many years it has been in vogue that the original Wright airplane would not be entrusted to The Smithsonian as long as the influence that had considered the Langley proposals in this country were in charge. At one time it was thought that Dayton might send a shrine for this most famous of its possessions. Yet now that Orville Wright has decided to send it to an English Museum, the public may wish to make of the damage done by the loss of Langley's model. It is to be hoped that the record of Langley as well as of the Wrights and that were day the most prized of all scientific possessions will find its final home in a national scientific shrine.

### Landing Fields and Community Development

**T**HE Government is not planning to furnish flying fields and equipment to Air Mail contractors who operate over air mail routes. To supply a completely equipped aircraft probably make the capital investment prohibitive. They will depend on the communities they serve to meet them. But on occasions throughout the country have realized that the first step to secure an airport. Unless there are

adequate airports for the contractor's planes to use, it is very unlikely that contractors will be awarded. The Government can not afford to permit the made to be subjected to unnecessary risks.

However there are lands to be watered routes which will pass over communities without landing fields. In such cases the contractor will very likely be forced to purchase or lease a field. As the contractor's capital may be limited, he will tend to buy field sites from the towns where real estate is cheap. When an Air Mail route has been established for a term of years, the towns itself may lead to expand toward the field.

The growth of the use of the automobile has been made possible only by the great expense it has given to road building by the national government, by states and by cities. The form of subsidy has been given by the cities people by taxation. Street cars on automobile roads and far distances have been an important factor in causing the funds to be spent for roads. The larger part, however, has come from general taxes. It is probable that some such plan will ultimately be devised for the development of landing fields. As this appears to be a local function, cities may furnish the funds, states the branch airport facilities and emergency landing fields and the national government the main trunk line, airway between and other aids to flying.

### World Speed Records

**S**O long as the landing speed requirement is the only factor for setting planes is limited to seventy-five miles per hour the world speed record may remain abroad. There, the landing speed may be very much higher, the principal thought being flying speed. The same ideas behind the construction of speed planes here and abroad are very different.

Our racing planes are built by the Army and Navy to test new features that may later be incorporated in pursuit planes. They are usually intended to compete in the Pulitzer Race and landing speeds of over seventy-five miles per hour would require not only very carefully prepared landing fields but a source where emergency landings could be made with some degree of safety.

Ahead, construction build their own speed planes to enhance their position with the ultimate purpose of selling their machines to the government. The landing speed element is not regarded as important as it is here. Therefore, when comparisons are made between the ability of aeronautical engineers and designers here and abroad, the landings imposed on their designs should be considered.

There is not the slightest doubt but that American aeronautical engineers could produce airplanes with a speed that would surpass the existing world records if they were not hampered by landing speed requirements.



## \$7,500,177.42 Contracts with the Industry

For the first time there has become available for publication, the total business that the Army and Navy have outstanding with the aeronautical industry at a particular time. General Patrick has made these figures public in the language of the Select Committee inquiry into the Air Service (Part 2, pp 820-821). The table shows that on Dec. 31, 1935, there

were contracts for \$7,500,177.42 in process of completion with the aeronautical industry for airplanes and engines. This does not include orders for airplanes or aeronautical accessories and supplies.

The following table shows how the contracts were divided as of Dec. 31, 1935.

MANUFACTURER	ARMY	NAVY	TOTAL
<b>Amesbury Plant and Motor Corporation</b>			
Manufacturing parts	\$ 283.30		
130 flywheel motors		890,200.00	
<b>Atlantic Aircraft Corp.</b>			
180 modified DH-5, with steel fuselage and landing gear	364,774.15		
<b>Borg-Warner Aircraft Co.</b>			
43 pursuit planes, PW-9 and spares (14 for Navy)	809,535.00		
Manufacturing spares	5,700.00		
75 modified DH-5 (for Navy)	\$4,000.00		
60 H-12 planes (125, per sec complete)		200,000.00	
22 H-12 planes		202,000.00	
3 P-12 planes		100,000.00	
2 C-123 planes		65,000.00	
<b>Chrysler-Vought Corp.</b>			
50 C-123 planes and spares		233,200.00	
<b>Consolidated Aircraft Corp.</b>			
60 training planes, PT-1, and spares	\$80,000.00		
<b>Cor-Moran Aircraft Corp.</b>			
2 amphibious planes, ATL, and spares (1 ready for delivery)	21,250.00		
<b>Curtiss Aeroplane &amp; Motor Corp.</b>			
3 Model V-149 engines	230,000.00		
2 H-149 engines	25,000.00		
Manufacturing spares parts (Engine)	9,250.00		
Manufacturing spares parts (Propeller)	170,000.00		
Manufacturing 75 sets, spares	\$1,000.00		
24 pursuit planes to be built		200,000.00	
<b>Douglas Co.</b>			
6 air transports, C-1	133,500.00		
16 training planes, ATL, and spares (2 delivered)	107,200.15		
1 light bombardment plane, XLH-1	80,000.00		
<b>Leeming Aeronautical Engineering Corp.</b>			
24 C-123 planes and spares	220,200.00		
2 C-123 planes and spares		50,000.00	
<b>Packard Motor Car Co.</b>			
2 Model L-1, 2500 engines	183,500.00		
3 Model L-1, 2500 engines	60,722.40		
Manufacturing spares parts	4,312.47		
10 L-1, 2500 engines, 5 L-1, 2500 engines		200,000.00	
<b>Steel Products Engineering Corp.</b>			
75 modified Liberty engines (48 per sec complete)	170,000.00		
<b>Thos. Moore Aircraft Corp.</b>			
Manufacturing spares parts	7,149.20		
<b>Wright Aeronautical Corp.</b>			
Manufacturing engine spares parts	15,200.00		
124 J-4 engines and spares		1,000,000.00	
Conversion of 127W airplanes		20,000.00	
<b>Total</b>	<b>\$5,732,755.85</b>	<b>\$4,797,361.57</b>	<b>\$7,500,177.42</b>

## Stability and Controllability of Airplanes

### Part VII. Actual Airplanes and the Tail Spin

By B. V. KORVIN-KROKOVSKY

We have shown how the stability in yaw and roll can be lost separately, what is the immediate effect of the adverse control, and how the relative proportion of stability in roll and in yaw affects the flight of uncontrollable models. Now we will endeavor to show how these factors affect the flight of actual airplanes, and how they affect the response of an airplane to control. In the flight of an uncontrolled airplane a number of air forces act on it. We do not need to dwell here upon the nature of actual aerodynamic forces, and how they are affected by the wind, and when they are self-induced and are self-sustained before we can discuss the effect of control. We will concentrate our attention now on three characteristics of interest stability when not in control, and explaining the different nature of their internal causes. These cases are: a) Stable in yaw and neutral in roll, b) Neutral in yaw and stable in roll and c) Stable both in yaw and in roll.

#### Spiral Instability

The airplane stable in yaw and neutral, or nearly neutral in roll, is characterized by tendency to develop spiral instability, which is the more pronounced the higher the stability in yaw. This type is essentially similar to the case of the stable R shown in Fig. 13. Both on airplanes of left and right-hand rotation, whether they are observed to start the loss and to finish it gradually or left alone for a sufficient time in heavy weather, an airplane may be placed by a gust of wind in a position favorable for starting a turn, bank and roll, and will show its instability as such the quicker. In the case of such an airplane the rudder will control the turn, but will not control the roll, consequently little. The rudder can still be used for control of the roll at lower air speeds, but its movements then must be very brisk, as only before that of smaller velocity of yaw must be depended on. The fact of the airplane being neutral in roll and stable in yaw and therefore there will be practically no control effect. A velocity turn cannot be made, therefore, by the rudder alone, and it is not even advisable to start it with the rudder. The action of the rudder merely results in a change of direction, and a good turn, as the airplane has no tendency to roll in response to banking. On the other hand the action of the rudder causes roll, and the stability in yaw will make the airplane yaw in response to even a very slight side slip, which is not desirable. Perfect turns can then be started and accomplished by the adverse action, the rudder being being moved from its control position, thereby the turn, the outer wing moving faster than the inner one has less lift and gives the airplane a tendency to overshoot. This tendency can be corrected only by the action of the adverse, and requires holding the stick in the direction of overshoot for the time. During the overshoot without the use of the rudder and a tendency to overshoot are the most conspicuous characteristics of an airplane inclined to be spirally unstable.

As the control in roll is the case of such an airplane as shown in the flying action of the adverse, and their drag will not be sufficient because the yaw has very little to do with the roll. The yaw of the airplane with heavy wash-out differential action is liable to do this case more harm than good, as the airplane already has a tendency to overshoot and overshoot. As the adverse action will the airplane will develop its inertia and damping without any assistance from the rudder, they are liable to move off and ineffective. Adverse or should be corrected, therefore, in proportioning the adverse so as to get the best possible lifting efficiency, long, narrow airfoil on all four panels of a biplane usually neutralizes this fact.

As the case of spiral instability lays in the lack of

stability in roll, the evident remedy is to increase it by increasing the dihedral or by the addition of non-rod planes. In most of the airplanes a degree or two of dihedral can be added in raising without any structural changes, and this may make a vast difference in the behavior of the airplane. The ability to keep the direction of flight with hands off will be improved, the rudder will become more effective as a means for steering, and the adverse will usually be found to be more sensitive because of being assisted by the rudder.

The ability to keep the direction of flight with hands off will be improved, the rudder will become more effective as a means for steering, and the adverse will usually be found to be more sensitive because of being assisted by the rudder. The ability to keep the direction of flight with hands off will be improved, the rudder will become more effective as a means for steering, and the adverse will usually be found to be more sensitive because of being assisted by the rudder. The ability to keep the direction of flight with hands off will be improved, the rudder will become more effective as a means for steering, and the adverse will usually be found to be more sensitive because of being assisted by the rudder.

Let us consider now an airplane very stable in roll and almost neutral in yaw. This airplane is much more likely to keep its direction of flight with hands off than the previous one. A gust of wind may cause the airplane to bank. It will roll itself without the pilot's intervention after a short side slip. The direction of flight will not be changed appreciably during the side slip, because there is no tendency to yaw in response to it. For the same reason the side slip can be used to start the adverse, and the adverse is virtually equivalent to side slipping or shuddering. Given a sufficient amount of damping in yaw, such an airplane probably will be controlled by pilots at high directions.

The reason is that the adverse will be started and accomplished readily by the rudder alone. The action of the rudder causes a yaw in response to which the airplane stable in roll will bank. During the turn the tendency to overshoot due to the higher velocity of the outer wing will be present, but will be corrected automatically by slight side slipping, and will not require intervention of the pilot. As far as the behavior of the pilot goes, the airplane will have an tendency to overshoot. Ability to be started by the rudder alone and that of automatic tendency to overshoot are characteristics for this type of airplane.

#### Yaw

As the rudder can be successfully used for control of the roll, both by the yaw and around efforts, the adverse are not even required in the yaw direction, as efficiency may be. As the roll is the case of such an airplane much more likely to keep the direction of flight with hands off than the previous one. A gust of wind may cause the airplane to bank. It will roll itself without the pilot's intervention after a short side slip. The direction of flight will not be changed appreciably during the side slip, because there is no tendency to yaw in response to it. For the same reason the side slip can be used to start the adverse, and the adverse is virtually equivalent to side slipping or shuddering. Given a sufficient amount of damping in yaw, such an airplane probably will be controlled by pilots at high directions.

Washed-out or differential adverse fitted to an airplane stable in roll derive their efficiency from three conditions: sense-roll and first and second yaw effects—and therefore

















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